EPOXYMASTIC COATING SYSTEM
FOR
STRUCTURAL STEEL

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SUMMARY

This evaluation of proprietary aluminum filled, two-component epoxymastic coatings was performed by the Chemicals Section in order to add competitive products with similar characteristics to the list of designated sources DS: 113.21.1. The evaluation consisted of laboratory chemical and physical analyses and the determination of comparative durability of the epoxymastic coatings based on salt spray corrosion resistance and accelerated weather resistance tests. The performance of the epoxymastic test samples were compared with that of Carbomastic 15 which was used as a standard.

Seven aluminum filled and one yellow pigmented (non-metallic) epoxymastic coating samples were evaluated. Four of the aluminum epoxymastic samples, two of which were previously approved, were found to have equivalent application and durability properties and they were recommended for inclusion in the designated sources list. The other three aluminum filled epoxymastic coatings, two of which were cold temperature curing coatings, were not acceptable because of doubtful performance. The yellow coloured epoxymastic coating had excellent durability but additional testing of this modified epoxymastic coating in other colours was required prior to its inclusion in the designated sources list.

In general, the evaluation also indicated that the aluminum epoxymastic coating provided better corrosion protection of steel when it was applied over blast cleaned steel (SSPC-SP6 or better) rather than over minimally prepared surface recommended by the manufacturer. In addition, for optimum performance, the maximum coating thickness recommended by the manufacturer appeared to be required, preferably applied in two coats, over areas with deep corrosion profile.

INTRODUCTION

Coating System 21.1 in Designated Sources List DS: 113 is a proprietary protective coating consisting of a two-component, high solids, aluminum or solid colour pigmented epoxymastic as described in M.I. 72[1]. It is recommended particularly for application to minimally prepared structural steel surface which has tightly bound rust and old paint remaining. Best results, however, are obtained when the coating is applied over blast cleaned steel but when this method of surface preparation is impractical, the coating can be applied over hand or power tool cleaned steel surface according to the manufacturers. In order to expand on the list of designated sources for epoxymastic coating to include other competitive products, a laboratory evaluation has been performed by the Chemicals Section.

TEST MATERIALS

At the time of the epoxymastic evaluation, it was known that only a few paint manufacturers produced this type of coating. Invitations for submission of test samples were therefore sent only to five selected manufacturers. A total of seven aluminum pigmented epoxymastic samples, two of which were low temperature curing coatings and one sample of yellow pigmented epoxymastic, together with the manufacturers product data sheets were received for evaluation from five suppliers (Appendices 1 and 2). The two special samples of low temperature curing coatings in aluminum and metallic green colours were modified versions of the Carbomastic 15 coating supplied by Corrosion Service Co. The yellow pigmented epoxymastic coating sample containing no aluminum pigment was supplied by Ameron Canada, Ltd.

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[1] Technical Data on Approved Coating Systems Designated Sources List DS: 113, February 1984 by R. Y. Fujii and R. A. Sterk

TEST PROCEDURE

The evaluation of epoxymastic coatings consisted of laboratory chemical analyses of the components and the determination of physical properties peculiar to this type of coating such as, pot life, consistency and curing time after mixing of the components. The effect of temperature on workability, curing time, and application properties was also examined for the special low temperature curing coatings. In addition, the salt spray corrosion resistance and accelerated weather resistance properties of the coatings were determined in accordance with the general test methods described in the following references:

CGSB 1-GP-71	Methods of Testing Paints and Pigments
ASTM B117	Standard Method of Salt Spray (Fog) Testing
ASTM G23	Standard Recommended Practice for Operating Light- And Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Nonmetallic Materials
ASTM D822	Standard Recommended Practice for Operating Light- And Water-Exposure Apparatus (Carbon-Arc Type) for Testing Paint, Varnish, Lacquer, and Related Products.

Steel Structures Painting Council (SSPC) Specifications.

PREPARATION OF TEST PANELS

For salt spray corrosion resistance and accelerated weather resistance tests, the coatings were applied by conventional spray over wire brush cleaned (SSPC-SP2) rusted steel panels and over blast cleaned (SSPC-SP10) steel panels to a dry film thickness of approximately 150 µm for each of the test samples. One of the test samples, Sterling #14238, was brush applied because it was not suitable for conventional spray application. The prepared panels were cured for a minimum of seven days prior to salt spray and weatherometer exposure testing.

TEST RESULTS

Physical and Chemical Analyses

The laboratory physical and chemical test results of the five aluminum epoxymastic coating samples in TABLE 1 indicate that with the exception of one product, Sterling Ltd. #14238, four of the test samples have similar characteristics. Carbomastic 15 supplied by Corrosion Service Company has been used as a standard for comparison. The Carbomastic 15 aluminum epoxymastic coating has a tendency to develop a brownish surface discolouration described as "bronzing" by the manufacturer. This condition which is apparently caused by the presence of moisture in the coating mixture or on the steel surface during coating application is temporary and it will diminish upon exposure of the coating to the elements according to the manufacturer. The competitors have claimed that their products will not show bronzing or other discolouration.

The Sterling Ltd. #14238 Epoxy Mastic compound appears to be a coal tar based epoxy coating with a very strong, rather unpleasant odour. Although it contains aluminum pigment, the colour of the coating is dark brown rather than aluminum due to the presence of black coal tar. In addition, the mixing proportion for this coating sample is one part base to two parts hardener by volume rather than in equal proportion as in the other four samples. The long curing or hard dry time and poor workability together with the above differences show that the Sterling Ltd. #14238 coating is different from the other four aluminum epoxymastic samples.

Since the aluminum epoxymastic is a high solids catalyzed epoxy coating, material application and curing temperatures should be greater than 10°C for maximum performance for most of the test samples. Ambient and surface temperatures may be as low as 4°C for Carbomastic 15 application, but the drying time will be excessively long in the order of 6 days between coats and 20 days final cure. Ameron Canada Ltd. manufacturer of Amerlock 400 series epoxymastic coatings, has stated that an accelerator can be added to their product which will permit the application and curing of their epoxymastic coating at cold temperatures down to -7°C.

TABLE 1

Physical and Chemical Test Results of Aluminum Epoxymastic

Lab. Sample Number	84-50000 /01	84-50004 /05	84-500010 /11	84-50016 /17	84-50022 /23
Manufacturer	Valspar Inc.	Corrosion Services	Sterling Ltd.	International	Ameron
Mfr. Code Number	75-A-1 A/B	Carbomastic 15	14238 (Brown)	ZE728021/990116	Amerlock 400AL
Tests					
Mass/L (kg) (part A/B)	1.20 / 1.30	1.22 / 1.44	1.18 / 1.42	1.10 / 1.20	1.21 / 1.35
Consistency (sec.with 1000g)	44	47	108	14	24
Drying Time (hrs. @25°C)					
to touch	1.9	1.2	2.5	2.6	3.4
hard dry	4.9	5.6	8 - 16	4.6	5.6
Specular Gloss	42.3	94.6	84.9	75.6	40.8
Reflectance (Y)	26.9	21.4	8.0	27.6	29.1
Workability					
spray	Good	Good	Very Poor	Good	Good
brush	Fair - Good	Good	Poor	Fair - Good	Fair - Good
Sag Test (225 µm dry)	pass	slight sag	not done	pass	pass
Pot Life (hrs. at 25°C)	3.75	3.75	4.0	3.5	3.5
Mix Ratio by Vol. A:B	1:1	1:1	1:2	1:1	1:1
Pigment in Part A (% mass)	18.0	18.8	29.0	16.2	20.7
Volatile in Mix (% mass)	8.1	7.7	2.5	14.1	3.8
Pigment Comp. (% mass)					
Insoluble	3.0	2.0	0.6	9.0	2.0
Aluminum	90.0	94.0	95.7	83.7	95.3
Total Solids % by Volume (mfr. data)	90	90 ± 1	90	90 ± 2	90

This claim has not been confirmed by the laboratory at this time. It should be noted that temperature has a significant effect on drying time and pot life of the epoxymastic coatings so that the manufacturers' recommended application instructions should be carefully followed. Due to the presence of flammable hydrocarbon solvents, epoxy resin, and amines or polyamides which may cause irritation or burns to skin, eyes, and mucous membranes, it is recommended that the manufacturers' safety precautions for the products be observed to protect personnel against toxic hazards particularly when epoxymastics are used in confined areas.

Special Modified Epoxymastics

Three special modified epoxymastic coatings have also been examined in this evaluation, TABLE 2. They are low temperature curing coating, Carboline 1304-242 in aluminum and in metallic green colours supplied by Corrosion Service Co., and a non-metallic yellow pigmented epoxymastic coating, Amerlock 400 (available in various colours) manufactured by Ameron Canada, Ltd. The Carboline 1304-242 samples have been analyzed for physical and chemical properties but the Amerlock 400 yellow was not analyzed because of insufficient amount of sample. The characteristics of the Carboline 1304-242 low temperature curing coatings are similar to those of Carbomastic 15 aluminum epoxymastic except for lower solids content, lower temperature (-18°C) curing and shorter pot life. Carboline 1304-242 coatings tend to become viscous at low temperatures making them difficult to spray apply. For mixing purposes, the minimum material temperature of 2°C is recommended by the manufacturer. Laboratory tests indicate that this material will dry through in about 2 days at -14°C ambient temperature although the applied film is still soft after this time. Higher temperatures will eventually complete the curing process. The Ameron Canada, Ltd. product data sheet for Amerlock 400 (colours) indicates that this product also has slightly lower solids content, faster touch dry time, and shorter pot life than the corresponding aluminum epoxymastic coating, Amerlock 400 AL. According to the manufacturer, with the addition of about 0.28 L of accelerator #861 to 22.7 L of coating (1/2 pint to 5 gallons), the through dry time of Amerlock 400 coating is approximately 7 days at -5°C which appears to be about the minimum applicable temperature for this product.

TABLE 2

Physical and Chemical Test Results of Special Epoxymastics

Lab. Sample Number	84-50002 /03	84-50006 /03	84-500029 /30
Manufacturer	Corrosion Service	Corrosion Service	Ameron Canada
Mfr. Code Number	1304-242 Metallic Green 941	1304-242 Aluminum C901	Amerlock 400 Yellow
Type	Cold Curing to -18°C	Cold Curing to -18°C	Cold Cure to -7°C with Accelerator
Mass/L (kg) (Part A/B)	1.29 / 1.19	1.39 / 1.19	Insufficient sample for
Consistency (sec. with 1000 g)	220	61	material analysis
Drying Time (hrs. @25°C / -14°C)			(from Mfr. Product data)
to touch	1.9 / 2.5	1.0 / 3.0	6 hrs. @ 21°C
through dry	3.1 /48 (still soft)	1.5 /48 (still soft)	20 hrs. @ 21°C
Specular Gloss	7.5	5.5	-
Reflectance (Y)	24.3	37.1	-
Workability			
spray	Fair - Good	Fair - Good	for airless or conventional
brush	Fair - Good	Fair - Good	-
Sag Test (225 µm dry)	pass	pass	200 µm dry film
Pot Life (hrs. @ 25°C)	3.75	3.25	2.5 hrs. @ 21°C
Mixing Ratio by Volume A:B	2:1	2:1	1:1
Pigment in Part A	34.8	nil	no test results
Pigment in Part B	27.3	27.3	no test results
Volatile in Mix (% mass)	28.1	25.9	no test results
Pigment Composition (% mass)	Part A / Part B	Part A / Part B	no test results
Insoluble	87.5 / 0.6	nil / 0.6	
Aluminum	- / 96.2	nil / 96.2	
Heat Loss 925°C	9.8 / -	nil / -	
Total Solids % by Volume (mfr. data)	62 ± 2	62 ± 2	83

Salt Spray Corrosion Resistance

Salt spray exposure test results (TABLE 3) and photographs of the exposed panels (Figure 1) show that after 1000 hours of exposure in the salt spray cabinet, all of the aluminum filled epoxymastic coatings except the two cold temperature curing coatings Carboline 1304-242, have comparable durability to that of Carbomastic 15 when the coatings are applied on blast cleaned (SSPC-SP10) steel panels. The two cold temperature curing coatings supplied by Corrosion Service Co. are not as durable because of excessive blistering or pinpoint rusting of the applied coating. Their durability is reduced further when these cold curing epoxymastics are applied and cured at cold temperatures of about -14°C. It appears that these two coatings produce dry films that are more porous than that of Carbomastic 15. The scored panels of all of the applied epoxymastic samples show considerable rust staining at the score marks but rust creepage at the score is minimal. Pinpoint rusting over the entire coated panel of some test samples indicates that salt solution has penetrated the barrier coating at pinholes or craters in the coating which were caused by bubbles of air, moisture, or solvent in the coating or on the steel surface during coating application. These test panels also have a fair amount of undercutting or spread of corrosion beneath the coating which is not visible until the coating is removed from the panel. The Ameron 400 yellow epoxymastic has corrosion and weather resistance properties equal to or better than that of Carbomastic 15 (Figures 3 and 4).

When the epoxymastic coating samples are applied on wire brushed, rusted steel panels (SSPC-SP2), the salt spray test results (TABLE 4) and photograph (Figure 2) indicate that the durability of the epoxymastic coatings is somewhat reduced. Generally, the rust beneath the coatings applied over SP2 prepared steel panels tends to increase the degree of blistering and lifting of the applied coatings. The adhesion of the Carboline cold temperature curing epoxymastic and Sterling coal tar epoxymastic coatings applied on rusted steel panels is less than satisfactory. The other competitive aluminum filled epoxymastic and the yellow pigmented epoxymastic coatings appear to provide satisfactory salt spray corrosion protection when they are applied on rusted steel.

TABLE 3

Salt Spray Test Results of Epoxymastic Coatings on SP10 Panels

Manufacturer	Valspar	Corrosion Service	Corrosion Service	Corrosion Service	Sterling	International	Ameron	Ameron
Code Number	75-A-1 A/B Aluminum	1304-242 Green 941	Carbomastic 15 Aluminum	1304-242 Alum. C901	14238 Brown	ZE728021/ 990116 Alum.	Amerlock 400 AL	Amerlock 400 Yellow
Panel Number	84-SB-2	84-SB-06	84-SB-10	84-SB-14	84-SB-18	84-SB-22	84-SB-26	84-SB-38
Coating thick (mm)	148	146	155	160	163	148	165	160
Exposure (hrs.)								
500	Bl. 6M upper left Med. rust in score. Rust 10	Bl. 7F over-all Med. rust in score. Rust 8	Bl. 4F at score Med. rust in score. Rust 9	Bl. 9M over-all Med. rust in score. Rust 8	Bl. 8F at score Med. rust in score. Rust 10	Bl. 8F at score Light rust in score. surface sweat Rust 10	Bl. 8F at score Two large Bl. #2 at score. Med. rust in score. Rust 10	Bl. 8F at score Med. rust in score. Rust 10
1000	Bl. 4F at score Med.-heavy rust in score. Rust 9	Bl. 4M over-all Med.-heavy rust in score. Rust 8	Bl. 7F over-all Med.-heavy rust in score. Rust 8	Bl. 7M over-all Med.-heavy rust in score. Rust 6	Bl. 3F at score Med.-heavy rust in score. Rust 9	Bl. 6F at score Med.-heavy rust in score Rust 10	Four large Bl. #1 near score Med.-heavy rust in score. Rust 10	Bl. 4F at score Med.-heavy rust in score Rust 10
Rusting under coating	nil	fair	slight pin-point	heavy	slight	nil	under blisters only	nil
Rust creepage along score mm total width	5	3	2	3	3 - 10	3	2	2

Bl. = Blister rating ASTM D714 Standard Method of Evaluating Degree of Blistering of Paints

Rust = ASTM D610 Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces

TABLE 4

Salt Spray Test Results of Epoxymastic Coatings on SP2 Panels

Manufacturer	Valspar	Corrosion Service	Corrosion Service	Corrosion Service	Sterling	International	Ameron	Ameron
Code Number	75-A-1 A/B Aluminum	1304-242 Green 941	Carbomastic 15 Aluminum	1304-242 Alum. C901	14238 Brown	ZE728021/ 990116 Alum.	Amerlock 400 AL	Amerlock 400 Yellow
Panel Number	84-SB-4	84-SB-8	84-SB-12	84-SB-16	84-SB-20	84-SB-24	84-SB-28	84-SB-40
Coating thick (μm)	150	145	160	163	165	147	155	155
Exposure (hrs.)								
500	Bl. 8F at score. Med. rust in score. Rusting under blisters. Rust 9	Bl. 7M overall. Lt.-Med.rust in score Rust 8.5	Bl. 9F at score. Med. rust in score. Rust 9	Bl. 9F at score. Lt. rust in score. Rust 9	Bl. 8F at score. Lt. rust in score. Rust 7 Cratering	Bl. 8F at score. Lt.-Med.rust in score. Rust 7 Surface sweat	Bl. 8F at score. Lt.-Med.rust in score. Rust 9 lower edge only.	Bl. 9F at score. Med. rust in score. Rust 10
1000	Bl. 7M at score. Med. rust in score. Rust 8	Bl. 6M overall. Med. rust in score and blisters Rust 8 Dark green discoloration	Bl. 8F at score. Med.-heavy rust in score Rust 8	Bl. 8F at score. Med. rust in score and under coating Rust 6	Bl. 7F overall Med. rust in score. Rust 7	Bl. 6F at score. Med. rust in score. Rust 7	Bl. 6F at score. Med. rust in score. Rust 9 lower edge only.	Bl. 7F at score. Med. rust in score. Rust 10
Adhesion of coating to rusted steel surface	Good	Fair-poor More rusting when coating is cold applied.	Good	Poor More rusting when coating is cold applied.	Fair-poor	Good	Good	Good

Bl. = Blister rating ASTM D714 Standard Method of Evaluating Degree of Blistering of Paints

Rust = ASTM D610 Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces

PHOTOGRAPHS OF

SALT SPRAY TEST PANELS OF EPOXYMASTIC
COATINGS AFTER 1000 HOURS OF EXPOSURE

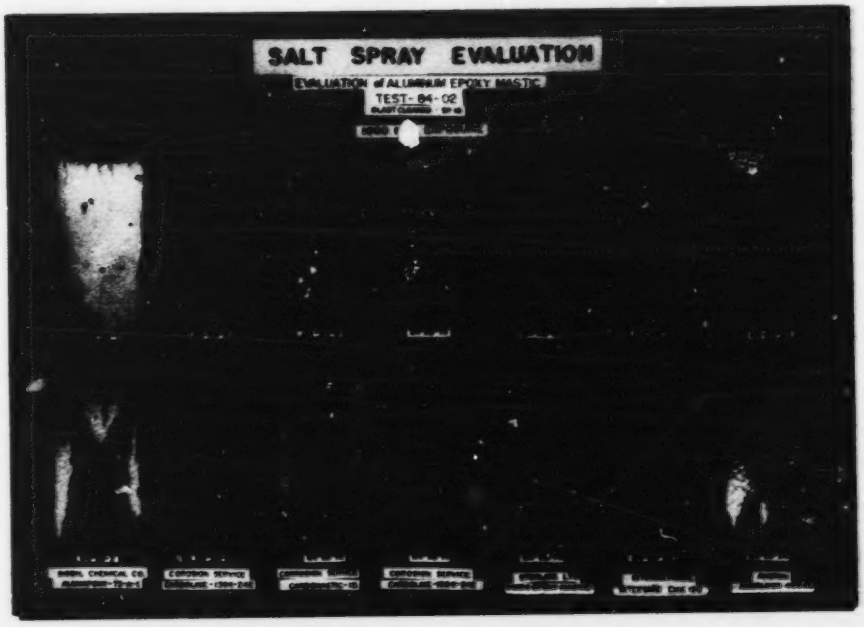

Figure 1: Coatings applied on SP10 blastcleaned steel panels

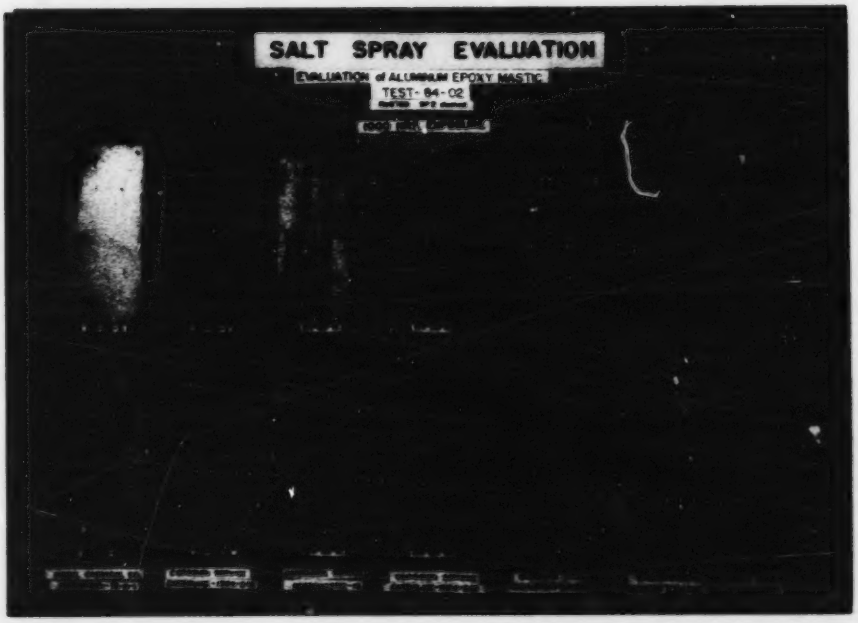

Figure 2: Coatings applied on SP2 cleaned rusted steel panels

PHOTOGRAPHS OF

SALT SPRAY AND WEATHEROMETER TEST PANELS OF AMERLOCK 400 YELLOW

Figure 3 Left: Coating on SP10 panels

Right: Coating on SP 2 panels

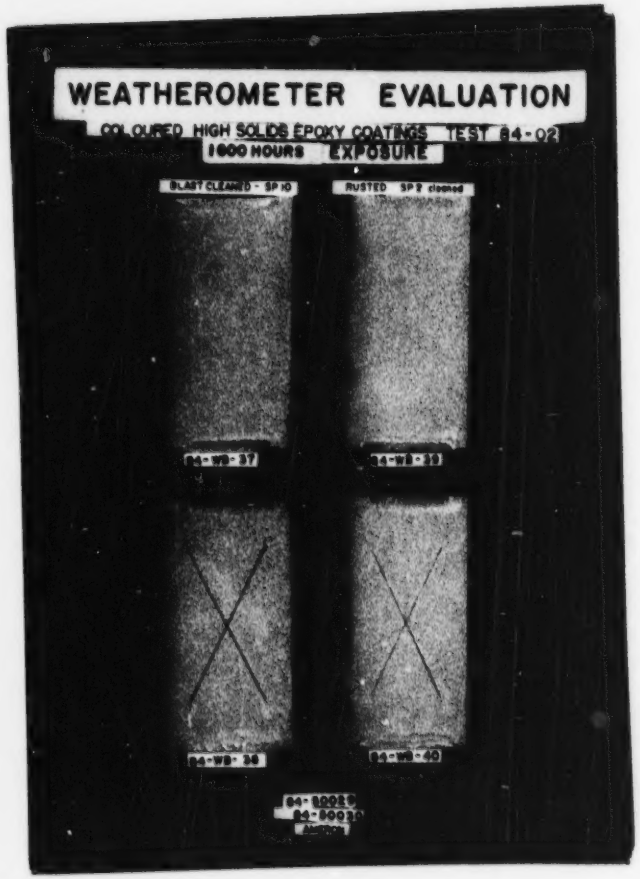
WEATHEROMETER EVALUATION
COLOURED HIGH SOLIDS EPOXY COATINGS TEST 84-02
1000 HOURS EXPOSURE
BLAST CLEANED - SP 10
RUSTED SP 2 cleaned

Figure 4 Left: Coating on SP10 panels

Right: Coating on SP 2 panels

For steel surface having rough corrosion profile or with tightly bound rust, it seems advisable to apply the manufacturer's recommended coating thickness for severe environments, viz. approximately 200 to 225 μm dry film thickness of epoxymastic coating in one or two coats in order to minimize the formation of pinholes or craters and subsequent corrosion of the steel substrate. The salt spray test results also indicate that existing rust beneath the applied epoxymastic coating is not incorporated into the coating. If anything, rusting of the steel substrate tends to increase if there are breaks such as pinholes or craters in the barrier coating. Therefore, for surface preparation of rusted existing steel, all loose scale and loose powdery rust or old paint should be removed preferably by abrasive blast cleaning to SSPC-SP7 or better still to SSPC-SP6 surface preparation prior to epoxymastic coating application.

Accelerated Weather Resistance

One of the characteristics of catalyzed epoxy coatings upon weathering is the rapid loss of gloss followed by chalking or surface degradation of the applied epoxy binder due to the action of light and oxygen and eventual erosion or washing away of thin layers of weathered vehicle or binder. The loss of gloss and chalking of all of the applied epoxymastic coating samples upon exposure are evident in the weatherometer test results in TABLES 5 and 6 and in the photographs, Figures 5 and 6. However, there appears to be very little erosion of the applied coatings probably due to the protective properties of the pigments used in the formulations.

The weatherometer test results indicate that the accelerated weathering properties of the epoxymastic coatings are generally better when the coatings are applied on clean steel rather than on rusted steel. As determined in the salt spray test, there is a greater risk of pinholes forming in the aluminum epoxymastic coating when it is applied over rusted steel surface with corrosion developing beneath the applied coating upon weathering. The weatherometer test results also indicate that a dry film thickness of about 200 μm recommended by the manufacturers for severe exposure, is essential when the coating is applied over corroded and pitted steel surface which is cleaned to SSPC-SP7 or preferably to SSPC-SP6 surface preparation.

TABLE 5

Weatherometer Test Results of Epoxymastic Coatings on SP-10 Panels

Manufacturer	Valspar	Corrosion Service	Corrosion Service	Corrosion Service	Sterling	International	Ameron	Ameron
Code Number	75-A-1 A/B	1304-242	Carbomastic 15	1304-242	14238	ZE728021/	Amerlock	Amerlock
Colour	Aluminum	Green 941	Aluminum	Alum. C901	Brown	990116 Alum.	400 AL	400 Yellow
Panel Number	84-WB-2	84-WB-06	84-WB-10	84-WB-14	84-WB-18	84-WB-22	84-WB-26	84-WB-38
Coating thick (μm)	150	145	150	150	137	150	155	160
Exposure (hrs.)								
0	Gloss 27	Gloss 5	Gloss 95	Gloss 2	Gloss 45	Gloss 33	Gloss 25	Gloss 46
800	Gloss 3 sl. chalking Darker Colour E = 4.53	Gloss 3 Chalk 6 Lighter E = 4.57 Green fading	Gloss 14 Chalk 7 Lighter E = 15.73	Gloss 2 Chalk 7 Lighter E = 6.77	Gloss 2 Chalk 6 Dark Brown E = 6.32 White haze	Gloss 3 sl. chalking Lighter E = 3.23	Gloss 5 No chalking sl. Lighter E = 1.68	Gloss 6 No chalk sl. darker E = 8.32
1600	Gloss 2 Chalk 7 sl. darker alum. colour E = 3.86	Gloss 2 Chalk 2 Pinholes Dark alum. E = 6.73 Green colour faded	Gloss 7 Chalk 5 Light alum. colour E = 24.81	Gloss 2 Chalk 3 sl. Lighter alum. colour E = 7.53	Gloss 2 Chalk 2 Blackish alum. colour E = 3.55 Dark brown color fading	Gloss 4 Chalk 8 sl. Lighter alum. colour E = 10.92	Gloss 3 No Chalk No change in alum. colour E = 1.32	Gloss 2 Chalk 9 No change in yellow colour E = 12.61

Gloss Rating: ASTM D523, Colour Difference (E): ASTM D2244, Cracking: ASTM D661, Checking: ASTM D660, Chalking: ASTM D659

TABLE 6

Weatherometer Test Results of Epoxymastic Coatings on SP-2 Panels

Manufacturer	Valspar	Corrosion Service	Corrosion Service	Corrosion Service	Sterling	International	Ameron	Ameron
Code Number	75-A-1 A/B Aluminum	1304-242 Green 941	Carbomastic 15 Aluminum	1304-242 Alum. C901	14238 Brown	ZE728021/ 990116 Alum.	Amerlock 400 AL	Amerlock 400 Yellow
Panel No.	84-WP-4	84-WB-8	84-WB-12	84-WB-16	84-WB-20	84-WB-24	84-WB-28	84-WB-40
Coating thick (µm)	147	150	155	160	150	150	152	160
Exposure (hrs.)								
0	Gloss 15	Gloss 4.5	Gloss 88	Gloss 2.5	Gloss 27	Gloss 36	Gloss 19	Gloss 31
800	Gloss 4 No Chalk Pinholes sl. darker E = 5.43	Gloss 2 Chalk 6 Pinholes Lighter E = 5.06	Gloss 11 Chalk 7 Pinholes Lighter E = 17.71	Gloss 2 Chalk 7 Pinholes Lighter E = 7.10	Gloss 2 Chalk 6 Pinholes Darker E = 6.17 white haze	Gloss 3 sl. Chalk Pinholes Lighter E = 5.24	Gloss 3 No Chalk Few Pinholes sl. Lighter E = 2.33	Gloss 8 No Chalk Few Pinholes sl. Darker E = 7.55
1600	Gloss 2 Chalk 8 Rust 8 sl. Darker E = 5.73 sl. rusting under blisters	Gloss 1 Chalk 4 Rust 6 Dark alum. E = 6.78 fair rusting under blisters Green fading	Gloss 4 Chalk 6 Rust 10 Lighter E = 26.24	Gloss 2 Chalk 6 Rust 8 sl. Lighter E = 5.30 sl. rust in pinholes	Gloss 1 Chalk 2 Rust 8 Black-alum. E = 3.23 Fair rust in pinholes	Gloss 3 Chalk 8 Rust 7 sl. Lighter E = 8.35 sl. rust in pinholes	Gloss 3 No change Rust 10 sl. Lighter E = 1.01	Gloss 2 Chalk 9 Rust 10 sl. Darker E = 11.60

Gloss Rating: ASTM D523, Colour Difference (E): ASTM D2244, Cracking: ASTM D661, Checking: ASTM D660, Chalking: ASTM D659

PHOTOGRAPHS OF
WEATHEROMETER TEST PANELS OF EPOXYMASTIC
COATINGS AFTER 1600 HOURS OF EXPOSURE

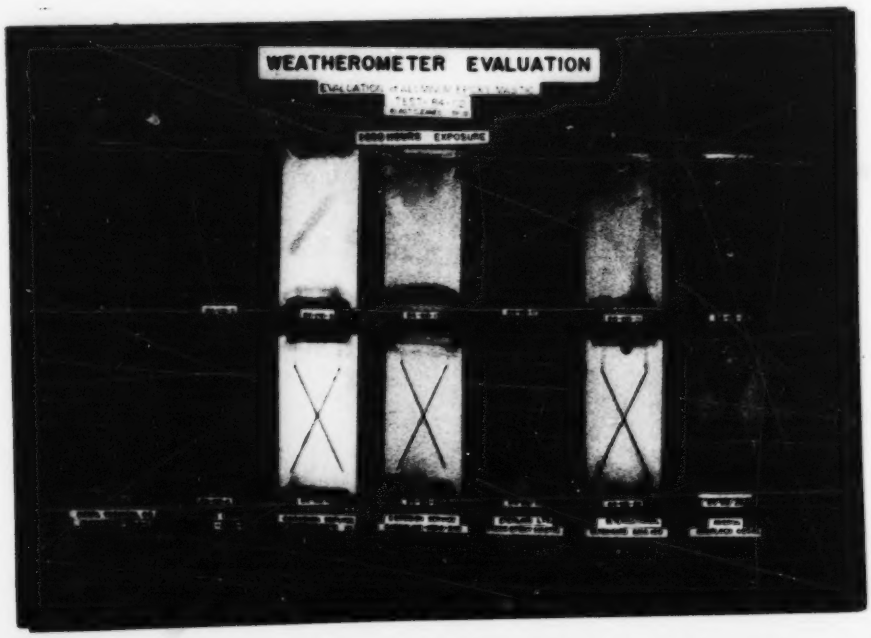

Figure 5: Coatings applied on SP10 blastcleaned steel panels

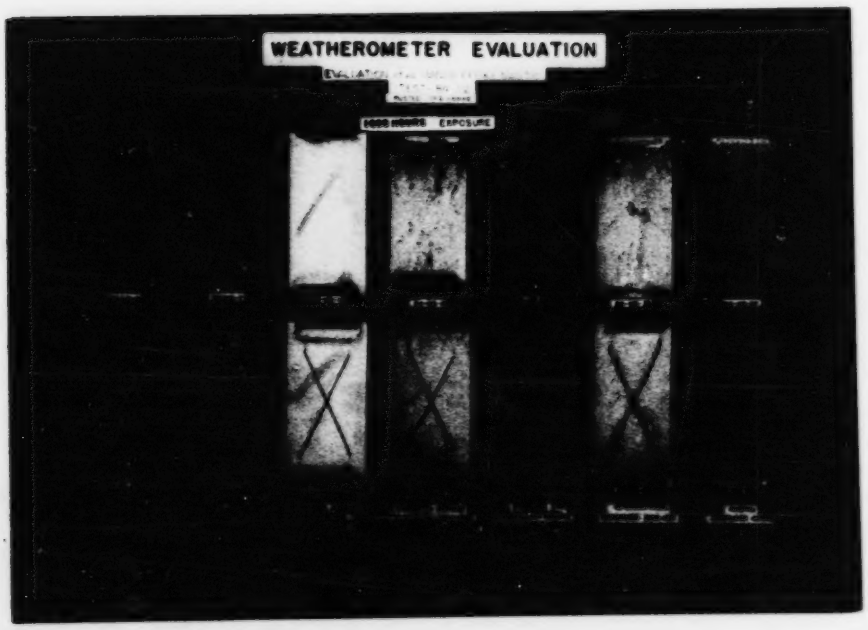

Figure 6: Coatings applied on SP2 cleaned rusted steel panels

The accelerated weather resistance properties of four aluminum pigmented epoxymastic coating samples - Valspar Inc. #75-A-1, International Paints Ltd. #ZE728021/990116, Ameron Canada Ltd. Amerlock 400 AL, Corrosion Service Co. #1304-242 Aluminum C901 - and one yellow coloured epoxymastic coating manufactured by Ameron Canada Ltd. Amerlock 400 yellow, appear to have comparable weathering characteristics as that of Carbomastic 15 supplied by Corrosion Service Co. The green cold temperature curing coating #1304-242 Green 941 from Corrosion Service Co. and the metallic brown coal tar epoxymastic coating #14238 from Sterling Ltd. do not have satisfactory durability. Both of the coloured epoxymastic coatings fade or discolour badly due to film degradation at the coating surface.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of laboratory physical and chemical analyses, salt spray corrosion resistance and accelerated weather resistance tests, four aluminum pigmented and one yellow coloured epoxymastic coating samples appear to have comparable durability. The following four aluminum epoxymastic coatings, two of which are already approved, are recommended for inclusion in the designated sources list DS: 113.21.1.

Aluminum Epoxymastic Coating Samples Recommended

Corrosion Service Co. Ltd.	Carbomastic 15*
International Paints (Can.) Ltd.	Intergard H.B. Mastic* Aluminum #ZE728021/ZE990116
Valspar Inc.	Alumapoxy #75-A-1
Ameron Canada Ltd.	Amerlock 400 AL H.S. Aluminum Epoxy Coating

* NOTE:

These two products are already listed in DS: 113.21.1

Ameron Amerlock 400 Yellow (also available in other colours)

This coating has excellent durability equivalent to or better than that of Carbomastic 15 coating which has been used as a comparative standard. Additional testing including cold temperature application and curing of Amerlock 400 in other colours, such as brown for weathering steel, green 503-109 and grey 501-107 will be necessary prior to its inclusion in the designated sources list. A sample of Amerlock 400 "Zanzibar Brown" is currently being examined.

Aluminum Epoxymastic Coating Samples not Recommended

The following samples of aluminum pigmented epoxymastic coatings have not been recommended for various reasons:

Sterling Ltd. #14238 metallic brown	- poor spraying properties - strong unpleasant coal tar odour - brown colour - different mix ratio from others - blisters, pinpoint rusting, poor adhesion in salt spray test - fades and discolours in weatherometer test
Corrosion Service Co. Carboline #1304-242 cold cure aluminum and green	- very low solids content - viscous at low temperatures - difficult to apply at low temperatures - less durable than Carbomastic 15 especially when applied at cold temperatures - blisters, pinpoint rusting, poor adhesion on SP2 steel in salt spray - green colour fades badly in accelerated weathering

The Carboline cold temperature curing epoxymastics are modified epoxy coatings which can be applied and cured at low (below freezing) temperatures according to the manufacturer but their durability appears to be less than satisfactory when they are applied over SSPC-SP2 cleaned steel. If cold temperature application is necessary, the Carboline #1304-242 aluminum pigmented coating could be considered but it should be applied over SSPC-SP6 cleaned steel.

There could be additional problems encountered dependent on application conditions therefore, until further tests are performed possibly under field trial application conditions, the use of Carboline cold curing epoxymastic coating is not recommended at this time.

In general, the aluminum pigmented epoxymastic coatings tend to form pinholes and craters during application especially over corroded steel surface, so that rather than applying the coatings in one thick coat, it would be preferable to apply two thinner coats with appropriate drying time between coats as recommended by the manufacturer. Although the manufacturers state that the epoxymastic coatings can be applied on minimally prepared (SSPC-SP2) steel surface, this evaluation indicates that maximum durability is realized when the coatings are applied over a more thoroughly cleaned steel surface, such as that obtained by SSPC-SP6 abrasive blastcleaning. Being proprietary products, these epoxymastic coatings may have slight variations in their handling and application characteristics, therefore, the manufacturer's representative should be present to observe the coating application in a contract, at least in the initial stages, until experience is gained by the contractor in the use of epoxymastic coatings.

Appendix 1

Test Samples of Aluminum Epoxymastic

Sample Number	Manufacturer	Product
84-50000/01	Valspar Inc.	Alumapoxy 75-A-1
84-50002/03	Corrosion Service Co.	Carboline 1304-242 green C941 - Cold Curing
84-50006/03	Corrosion Service Co.	Carboline 1304-242 aluminum C901 - Cold Curing
84-50004/05	Corrosion Service Co.	Carbomastic 15
84-50010/11	Sterling Ltd.	#14238 Epoxy Mastic Compound
84-50016/17	International Paints Ltd.	ZE728021/ZE990116 Intergard EMA190/191 H.B. Mastic Aluminum
84-50022/23	Ameron Canada Ltd.	Amerlock 400 AL H.S. Epoxy Aluminum
84-50029/30	Ameron Canada Ltd.	Amerlock 400 H.S. Epoxy Colours (Special test sample of O.S.H.A. Safety yellow with no aluminum pigment)

Appendix 2

Manufacturers' Product Data Sheets for Epoxymastic Coatings with Surface Preparation and Application Instructions.

JANUARY 1, 1981 / Printed in Canada
This supersedes all previous publications.
Always consult your Mobil representative for latest information and recommendations for Mobil Products.

ALUMAPOXY

75-A-1

FINISH	Bright Aluminum
VEHICLE TYPE	Modified Epoxy-Polyamide resin
PIGMENT TYPE	Silica and Metallic aluminum
SOLVENT TYPE	Aliphatic hydrocarbon
FLASH POINT, MINIMUM	105°F. (40°C.)
% SOLIDS BY VOLUME	90%
RECOMMENDED DRY FILM (per coat)	125μm - 175μm (5-7 mils)
COVERAGE (THEORETICAL	1,728 square feet per gallon per dry mil (35.4m²/L) per dry mil (25μm) average. The actual coverage will be less depending on application technique, job conditions and type of surface to be coated.
VISCOSITY AT 75°F. (24°C.)	70-80 Krebs units (when reduced 20%)
AVERAGE DRY TIME AT 75°F. (24°C.)	To touch 4 hours. Tack free 12 hours. To recoat 24 hours.
RECOMMENDED THINNER	For spray reduce up to 20% 7-T-12 For brush reduce up to 30% 7-T-1
RESISTANCE TO	Fumes and Spillage: Solvents - Good; Salts - Excellent; Moisture - Excellent; Acids - Good; Alkali - Good; Petroleum Products - Good; Dry Heat (120°C) - Continuous; major change in colour only at 177°C; Flexibility - Excellent; Weathering - Excellent.
RECOMMENDED PRIMER	Self Prime
POT LIFE 24°C (75°F)	4-5 hrs. with 20% reduction 7-T12. 5-6 hrs. with 30% reduction 7-T1. Shorter pot life can be expected at higher temps.
APPLICATION	Spray, Brush or Roller. Spray is recommended for best appearance and Performance. Brush or Roller may be used, but lower film thickness may result, and lap marks will be visible. CONVENTIONAL SPRAY (Suggested Equipment) DeVilbiss MBC-510 Spray gun, "E" Fluid Tip #704, #765 Air Cap Binks #18 Spray gun, 66 Tip, 66 PE or 63 PB Nozzle AIRLESS SPRAY Use of spray tips with .021 to .027" orifice is suggested, depending on available pressure and job conditions, with a minimum of 2500 psi tip pressure.
NOTE	A surface exudate haze may form in humid weather which must be washed off with mineral spirits, or detergent and water, to obtain topcoat adhesion.
CAUTION	For best results do not apply when temperatures are below 10°C (a minimum of 18°C. is preferred), or at relative humidities above 85%.
PACKAGE	A two component product supplied in separate packages in pre-measured quantity. Mix ratio is 1:1 by volume.

ALUMAPOXY

An epoxy mastic coating with metallic aluminum flake for added moisture protection. Designed to permit application to rusty steel. For use in those areas where higher performance is needed than can be obtained with conventional coatings, and only wire-brushing or power tool cleaning can be used for surface preparation.

Has good surface wetting qualities. Provides protection against fumes, dusts, splash, spillage, and moisture condensation. Upgrades soundly adherent conventional coatings system. Performs as a one-coat maintenance finish for many services. In the more severe exposures, provides a high performance primer for Mobil hi-build vinyl, epoxy, chlorinated rubber and urethane topcoats.

Also recommended for weathered aluminum and galvanize.

Not for use in sustained immersion.

PREPARATION: Surfaces should be washed clean of oil, grease or water soluble salts or other contaminants. Use hand or power tool cleaning per SSPC SP-2 or SP-3 to remove all loose paint, rust and dirt. Surfaces should be dry. Performance and longevity will be affected by the degree of surface cleaning achieved.

MIXING: Mix Component A and B in equal volumes to complete uniformity. A power-mixer is recommended; avoid over-agitation. At temperatures below 21°C a 15-30 minute induction interval should be allowed before use. This is not required at higher temperatures. For use generally thin material 20%.

PRIOR COATINGS COMPATIBILITY: This material may be applied over most aged alkyd, epoxy, coal tar epoxy, and zinc rich coatings which are in sound condition, tightly adherent, and suitable for overcoating.

OVERCOATS: Additional finishes may be applied where finish colours other than aluminum are desired, and are recommended for the more aggressive service exposures. In addition to recoating with itself, this material may be overcoated with Mobil's 27 Series Hi-Build Chlorinated Rubber, 83 Series Hi-Build Vinly, 89 Series Hi-Build Epoxy and 41 Series Hi-Build Urethane.

NOTE: This product has been designed for use on, and is compatible with, surfaces cleaned by other than abrasive blasting. It has shown satisfactory performance where good surface preparation was achieved.

However, such methods can vary greatly in their effectiveness in surface cleaning, and can directly affect the performance of the applied coating. Consequently, service longevity cannot be predicted.

NOTICE: This product is for industrial use only and is not intended or suitable for use in or around a household or dwelling.

DANGER: VAPOR HARMFUL. CAUSES IRRITATION. COMPONENT B CAUSES BURNS AND MAY CAUSE ALLERGIC, RESPIRATORY AND SKIN REACTION. COMBUSTIBLE. CONTAINS EPOXY RESIN, ORGANIC SOLVENT AND CORROSIVE AMINE. Do not get in eyes, on skin or on clothing. Avoid breathing vapor. Keep away from heat and open flame. Wash thoroughly after handling. Use with adequate ventilation. Wear a proper vapor/particulate respirator goggles, and impervious clothing for spray application. Use an air supplied mask in enclosed areas. Keep container closed Persons previously sensitized to Amines or with chronic respiratory problems must not be exposed to this product. FIRST AID: In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash skin with soap and water. Call a physician. Wash clothing before reuse. Discard contaminated shoes. If inhaled, remove to fresh air. If not breathing give artifical respiration, preferably mouth-to-mouth. Call a physician.

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Mobil Chemical Company / MAINTENANCE & MARINE COATINGS DEPARTMENT

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West Hill, Ont. M1E 4R6.
Tel.: (416) 284-1681 Telex: 065-24454.

Edmonton, Alberta
7943 Argyll Road, T6B 2C4.
Tel.: (403) 466-6668 Telex: 037-3915.

Montreal Quebec
8060 est, rue Jarry, Ville D'Anjou
H1J 1H5 / Tel.: (514) 351-3250

These products also available from:

Edison, New Jersey 08817
P.O. Box 250 / Tel.: (201) 321-6000

Beaumont, Texas 77704
P.O. Box 3431 / Tel.: (713) 835-5324

Kankakee, Illinois 60901
901 North Greenwood Avenue / Tel. (815) 933-5561

Los Angeles, California 90058
2647 East 37th Street / Tel.: (213) 589-6781

Louisville, Kentucky 40210 (Railroad Coatings)
1630 West Hill Street / Tel.: (502) 774-4411

Bogota, Colombia / Sao Paulo, Brazil
Delft, Holland / Mexico City, Mexico

carboline

product data sheet

CARBOLINE 1304-242

MANUFACTURED IN CANADA

SELECTION DATA

GENERIC TYPE:
High build, aluminum filled epoxy urethane mastic. Part A and B mixed prior to application.

GENERAL PROPERTIES:
Carboline 1304-242 will cure as low as -18°C (0°F) and will dry to handle or recoat in 24 hours at -7°C (20°F). It is a self-priming, high build coating with excellent adhesion to rusted steel and most aged coatings. Hand or power tool cleaning is acceptable surface preparation for most surfaces. For severely corroded surfaces, see surface preparation instructions for non-immersion service on reverse.

RECOMMENDED USES:
Carboline 1304-242 is a low-temperature curing coating, primarily recommended for repainting rusty steel and for upgrading old, deteriorated coatings. Also used where hand cleaned steel is being coated for the first time. Ideal for metal buildings, fences, piping, process equipment, highway bridges and exposed structural steel.

Not recommended for
Immersion service in acids, alkalies or solvents.

CHEMICAL RESISTANCE GUIDE:

Exposure	Immersion	Splash and Spillage	Fumes
Acids	NR	Fair	Very Good
Alkalies	NR	Good	Excellent
Solvents	NR	Good	Excellent
Salt	Excellent	Excellent	Excellent
Water	Excellent	Excellent	Excellent

TEMPERATURE RESISTANCE:
(Non-immersion)
Continuous: 82°C (180°F)
Non-Continuous 93°C (200°F)

Flexibility: Excellent

Weathering: Excellent

Abrasion Resistance: Fair

SUBSTRATES:
Rusty steel, galvanized steel, or others as recommended.

TOPCOAT REQUIRED:
Normally none, but can be topcoated with most generic types. Consult Corrosion Service Company Limited for specific recommendations.

C 1304-242
1082/CDN

COMPATIBILITY WITH OTHER COATINGS:
May be used over most generic types of coatings which are tightly adhering and properly prepared; inorganic and organic zinc primers. A test patch is recommended for use over existing coatings.

SPECIFICATION DATA

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
Carboline 1304-242	62% ± 2%

RECOMMENDED DRY FILM THICKNESS PER COAT:
125 microns (5 mils)

THEORETICAL COVERAGE PER MIXED GALLON*:
24.8 sq. m/L at 25 microns (1194 mil sq/ft)
5.0 sq. m/L at 125 microns (239 sq/ft at 5 mils)
*Note Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.

SHELF LIFE:
12 months minimum

COLOURS:
Aluminum C901, Metallic Blue 0939, Metallic Green 0941, and Metallic Red 0942 only.

GLOSS:
N/A

ORDERING INFORMATION

Prices are shown on Corrosion Service Company Limited price list or may be obtained from Corrosion Service representatives or Head Office. Terms: Net 30 days.

APPROXIMATE SHIPPING WEIGHT:

	4.5 Gal. Kit
Carboline 1304-242	- 25.3 kg (62 lbs)
Carboline Thinner #92	- 3.6 kg (8 lbs) in 4 L
	19.5 kg (43 lbs) in 20 L

FLASH POINT:
Pensky-Martens Closed Cup)
Carboline 1304-242 Part A - 27°C (80°F)
Carboline 1304-242 Part B - 40°C (104°F)
Carboline Thinner #92 - 6°C (42°F)

The technical data furnished above by the Carboline Company is provided for information purposes only and, to the best of our knowledge, is correct. However, no guarantee, warranty, representation or condition, express or implied, whether arising by statute, by operation of law, or otherwise (including merchantability and fitness for a particular purpose) is made or given with respect to this product and we assume no responsibility or liability of any kind for coverage, performance or damage (whether arising from negligence of vendor or otherwise) resulting from or occasioned by the installation, operation, use or performance of this product.

APPLICATION INSTRUCTIONS

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining correct surface preparation, mixing instructions, and application procedure. It is assumed that the proper product recommendations have been made. These instructions should be followed closely to obtain the maximum service from the materials.

SURFACE PREPARATION:

Remove any oil or grease from surface to be coated with clean rags soaked in Carboline Thinner #2 or toluol in accordance with SSPC-SP 1.

Steel: For immersion service, dry abrasive blast to a White Metal Finish in accordance with SSPC-SP 5 to a degree of cleanliness in accordance with NACE 1 to obtain a 25 - 75 micron (1 to 3 mil) blast profile.

For non-immersion service, clean per Power Tool or Hand Tool in accordance with SSPC-SP 2, respectively, to a cleanliness defined by SSPC-St 2 pictorial standards. Alternatively, for more severe environments, dry abrasive blast per SSPC-SP 7 (brush-off blast) to a degree of cleanliness defined by SSPC-Sa 1 pictorial standards. Water blasting is an acceptable means of preparing the surface to a cleanliness defined by SSPC-St 2.

MIXING:

Pre-mix Part A, add thinner and mix for five minutes. Mix the Part B until uniform, then combine and mix in the following proportions:

4.5 Gal. Kit

Carboline 1304-242 Part A - 3 Gallons
Carboline 1304-242 Part B - 1.5 Gallons
Thin up to 25% by volume with Carboline Thinner #92.

POT LIFE:

Pot life ends when coating becomes too viscous to use.

Temperature	Pot Life
32°C (90°F)	1 Hour
24°C (75°F)	3 Hours
2°C (35°F)	6 Hours

APPLICATION TEMPERATURES:

	Material	Surfaces
Normal	7-24°C (45-75°F)	-7-24°C (20-75°F)
Minimum	2°C*(35°F)*	-18°C (0°F)
Maximum	32°C (90°F)	38°C (100°F)

	Ambient	Humidity
Normal	-7-24°C (20-75°F)	50%
Minimum	-18°C (0°F)	0%
Maximum	32°C (90°F)	85%

*1304-242 will cure at temperatures as low as -18°C (0°F), however, for mixing purposes, a minimum material temperature of 2°C (35°F) is recommended.

Do not apply when the surface temperature is less than 2°C (5°F) above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY:

Use adequate air volume for correct operation.

Use a 50% overlap with each pass of the gun. On irregular surfaces, coat the edge first, making an extra pass later.

NOTE: The following equipment has been found suitable, however, equivalent equipment may be substituted.

Conventional: Use a 12mm (½") minimum I.D. material hose. Hold gun approximately 30-35mm (12-14 inches) from the surface and at a right angle to the surface.

Mfr. & Gun	Fluid Tip	Air Cap
Binks #18 or #62	67	67PB
DeVilbiss P-MBC or JGA	D	64
	Approx. .086" I.D.	

Airless: Use a 9mm (3/8") minimum I.D. material hose. Hold gun approximately 45-50cm (18-20 inches) from the surface and at a right angle to the surface.

Mfr. & Gun	Pump*
DeVilbiss JGB-507	QFA-514 or QFA-519
Graco 205-591	President 30:1 or Bulldog 30:1
Binks Model 500	Mercury 5C or B8-36

*Teflon packings are recommended and available from the manufacturer.
Use a .019 to .024" tip with 2400 psi.

BRUSH OR ROLLER:

Use clean, short-bristled brush or medium nap roller. Work coating into all irregularities. Brush or roller application may result in less bright or uniform aluminum colour.

DRYING TIMES:

Dry to Handle or to Topcoat	36 hours at -18°C (0°F)
	24 hours at -7°C (20°F)
	12 hours at 10°C (50°F)
	4 hours at 24°C (75°F)
	1 hour at 32°C (90°F)

CLEAN UP:

Use Carboline Thinner #2 or Cellosolve Acetat

STORAGE CONDITIONS:

Temperature: 2-43°C (35-110°F)
Humidity: 0-100%

C 1304-242
1062/CDN

CAUTION: Contains flammable solvents. Keep away from sparks and open flames. In confined areas, workmen must wear fresh airline respirators. Hypersensitive persons should wear gloves or use protective cream on face and hands. All electric equipment and installations should be made and grounded in accordance with the Canadian electrical code. Workmen should be required to use only non-ferrous tools and to wear conductive and non-sparking shoes in areas where explosion hazards exist.

carboline

SOLD AND SERVICED IN CANADA BY

CORROSION SERVICE COMPANY LIMITED
369 RIMROCK RD., DOWNSVIEW, ONT. M3J 3G2

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DEVELOPMENT PRODUCT 26.

CARBOLINE D1304-242

DATA SHEET

864

SELECTION DATA

GENERIC TYPE: High build, aluminum filled epoxy urethane mastic. Part A and B mixed prior to application.

GENERAL PROPERTIES: Carboline D1304-242 will cure as low as 0°F (-18°C) and will dry to handle or recoat in 24 hours at 20°F (-7°C). It is a self-priming, high build coating with excellent adhesion to rusted steel and most aged coatings. Hand or power tool cleaning is acceptable surface preparation for most surfaces. For severely corroded surfaces, see surface preparation instructions for non-immersion service on back page.

RECOMMENDED USES: Carboline D1304-242 is a low-temperature curing coating, primarily recommended for repainting rusty steel and for upgrading old, deteriorated coatings. Also used where hand cleaned steel is being coated for the first time. Ideal for metal buildings, fences, piping, process equipment, highway bridges and exposed structural steel.

NOT RECOMMENDED FOR: Immersion service in acids, alkalies or solvents.

CHEMICAL RESISTANCE GUIDE:

Exposure	Immersion	Splash and Spillage	Fumes
Acids	NR	Fair	Very Good
Alkalies	NR	Good	Excellent
Solvents	NR	Good	Excellent
Salt	Excellent	Excellent	Excellent
Water	Excellent	Excellent	Excellent

TEMPERATURE RESISTANCE: (Non-immersion)

Continuous: 180°F (82°C) Non-Continuous: 200°F (93°C)

FLEXIBILITY: Excellent WEATHERING: Excellent

ABRASION RESISTANCE: Fair

SUBSTRATES: Rusty steel, galvanized steel, or others as recommended.

TOPCOAT REQUIRED: Normally none, but can be topcoated with most generic types. Consult Carboline Technical Service for specific recommendations.

COMPATIBILITY WITH OTHER COATINGS: May be used over most generic types of coatings which are tightly adhering and properly prepared; inorganic and organic zinc primers. A test patch is recommended for use over existing coatings.

March 82-N

SPECIFICATION DATA

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
Carboline D1305-242	62%± 2%

RECOMMENDED DRY FILM THICKNESS PER COAT: 5 mils (125 microns)

THEORETICAL COVERAGE PER MIXED KIT*:

3 Quart Kit: 746 mil sq/ft (24.8 sq.m/1 at 25 microns)
149 sq/ft at 5 mils (5.0 sq.m/1 at 125 microns)

4.5 Gal. Kit: 4478 mil sq/ft (24.8 sq.m/1 at 25 microns)
896 sq/ft at 5 mils (5.0 sq.m/1 at 25 microns)

*NOTE: Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.

SHELF LIFE: 12 months minimum.

COLORS: Aluminum C901, Metallic Blue 0939, Metallic Green 0941, and Metallic Red 0942 only.

GLOSS: N/A

ORDERING INFORMATION

Prices may be obtained from Carboline Sales Representative or Main Office.
Terms - Net 30 Days.

APPROXIMATE SHIPPING WEIGHT:

	3 Qt. Kit	4.5 Gal. Kit
Carboline D1304-242	9 lbs. (4.1 kg)	52 lbs. (23.6 kg)
Carboline Thinner #92	9 lbs. (4.1 kg) in 1's	42 lbs. (19.1 kg) in 5's

FLASH-POINT: (Pensky-Martens Closed Cup)

Carboline D1304-242 Part A - 80°F (27°C)
Carboline D1304-242 Part B -104°F (40°C)
Carboline Thinner #92 - 42°F (6°C)

APPLICATION INSTRUCTIONS

SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in Carboline Thinner #2 or toluol in accordance with SSPC-SP 1.

Steel: For immersion service, dry abrasive blast to a White Metal Finish in accordance with SSPC-SP 5 to a degree of cleanliness in accordance with NACE #1 to obtain a 1 to 3 mil (25 - 75 micron) blast profile.

For non-immersion service, clean per Power Tool or Hand Tool in accordance with SSPC-SP 3 or SSPC-SP 2, respectively, to a cleanliness defined by SSPC-St 2 pictorial standards. Alternatively, for more severe environments, dry abrasive blast per SSPC-SP 7 (brush-off blast) to a degree of cleanliness defined by SSPC-Sa 1 pictorial standards. Water blasting is an acceptable means of preparing the surface to a cleanliness defined by SSPC-St 2.

MIXING: Pre-mix Part A, add thinner and mix for five minutes. Mix the Part B until uniform, then combine and mix in the following proportions:

	3 Qt. Kit	4.5 Gal. Kit
Carboline D1304-242 Part A	2 Quarts	3 Gallons
Carboline D1304-242 Part B	1 Quart	1.5 Gallons

Thin up to 25% by volume with Carboline Thinner #92.

POT LIFE: Pot life ends when coating becomes too viscous to use.

Temperature	Pot Life
90°F (32°C)	1 Hour
75°F (24°C)	3 Hours
35°F (2°C)	6 Hours

APPLICATION TEMPERATURES:

	Material	Surfaces	Ambient	Humidity
Normal	45-75°F (7-24°C)	20-75°F (-7-24°C)	20-75°F (-7-24°C)	50%
Minimum	35°F (2°C)*	0°F (-18°C)	0°F (-18°C)	0%
Maximum	90°F (32°C)	100°F (38°C)	90°F (32°C)	85%

*D1304-242 will cure at temperatures as low as 0°F (-18°C), however, for mixing purposes, a minimum material temperature of 35°F (2°C) is recommended.

Do not apply when the surface temperature is less than 5°F (2°C) above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: Use adequate air volume for correct operation.

Use a 50% overlap with each pass of the gun. On irregular surfaces, coat the edge first, making an extra pass later.

March 82-N

NOTE: The following equipment has been found suitable, however, equivalent equipment may be substituted.

Conventional: Use a ¼" minimum I.D. material hose. Hold gun approximately 12-14 inches from the surface and at a right angle to the surface.

Mfr. & Gun	Fluid Tip	Air Cap
Binks #18 or #62	67	67PB
DeVilbiss P-MBC or JGA	D	64
	Approx. .086" I.D.	

Airless: Use a 3/8" minimum I.D. material hose. Hold gun approximately 18-20 inches from the surface and at a right angle to the surface.

Mfr. & Gun	Pump*
DeVilbiss JGB-507	QFA-514 or QFA-519
Graco 205-591	President 30:1 or Bulldog 30:1
Binks Model 500	Mercury 5C or B8-36

*Teflon packings are recommended and available from manufacturer.

Use a .019 to .024" tip with 2400 psi.

BRUSH OR ROLLER: Use clean, short-bristled brush or medium nap roller. Work coating into all irregularities. Brush or roller application may result in less bright or uniform aluminum color.

DRYING TIMES:

Dry to Handle or to Topcoat	36 hours at 0°F (-18°C)
	24 hours at 20°F (-7°C)
	12 hours at 50°F (10°C)
	4 hours at 75°F (24°C)
	1 hour at 90°F (32°C)

CLEAN UP" Use Carboline Thinner #2 or Cellosolve Acetate.

STORAGE CONDITIONS:

Temperature: 35-110°F (2-43°C) Humidity: 0-100%

CAUTION: CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS, WORKMEN MUST WEAR FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSON SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPMENT AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHERE EXPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AND NONSPARKING SHOES.

To the best of our knowledge the technical data contained herein are true and accurate at the date of issuance and are subject to change without prior notice. User must contact Carboline to verify correctness before specifying or ordering. No guarantee of accuracy is given or implied. We guarantee our products to conform to Carboline quality control. We assume no responsibility for coverage, performance or injuries resulting from use. Liability, if any, is limited to replacement of products. Prices and cost data if shown, are subject to change without prior notice. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY THE SELLER, EXPRESS OR IMPLIED, STATUTORY, BY OPERATION OR LAW, OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

carboline

product data sheet

CARBOMASTIC 15

MANUFACTURED IN CANADA

SELECTION DATA

GENERIC TYPE: High build, modified aluminum epoxy mastic. Part A and Part B mixed prior to application.

GENERAL PROPERTIES: Self priming, high build coating with excellent adhesion to rusted steel and most aged paints. *Only a single coat required for most applications. Hand or power tool cleaning is acceptable surface preparation for most surfaces. For severely corroded surfaces, see surface preparation instructions for non-immersion service on page 2.

*In order to obtain a high reflective, uniform appearance over rough surfaces (such as a rusty tank) a thin second coat may be desirable for appearance only or a topcoat of Carboline® 1265.

RECOMMENDED USES: Particularly recommended for repainting rusty steel and for upgrading old, deteriorated coatings. Also used where hand cleaned steel is being coated for the first time. Ideal for metal buildings, fences, piping, process equipment, highway bridges and exposed structural steel.

NOT RECOMMENDED FOR: Immersion service in acids, alkalies or solvents.

CHEMICAL RESISTANCE GUIDE:

Exposure	Immersion	Splash and Spillage	Fumes
Acids	NR	Fair	Very good
Alkalies	NR	Good	Excellent
Solvents	NR	Good	Excellent
Salt Water	Excellent *	Excellent	Excellent
Water	Excellent *	Excellent	Excellent

*Discolors to gray.

TEMPERATURE RESISTANCE: (Non-immersion)

Continuous:	180°F (82°C)
Non-continuous:	250°F (121°C)

FLEXIBILITY: Excellent **WEATHERING:** Excellent

ABRASION RESISTANCE: Fair

SUBSTRATES: Rusty steel, galvanized steel, or others as recommended.

TOPCOAT REQUIRED: Normally none, but can be topcoated with most generic types. Alkyd or oil modified paints exhibit poor adhesion. Consult Carboline Technical Service for specific recommendations.

COMPATIBILITY WITH OTHER COATINGS: May be used over most generic types of coatings which are tightly adhering and properly prepared; inorganic and organic zinc primers. A test patch is recommended for use over existing coatings.

SPECIFICATION DATA

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
Carbomastic 15	90 ± 1%

RECOMMENDED DRY FILM THICKNESS PER COAT: (Measured in addition to the rust or steel substrate). 5 mils (125 microns) minimum.

For severe exposures 7 mils (175 microns) minimum is recommended.

THEORETICAL COVERAGE PER MIXED GALLON*:
1733 mil sq. ft. (42.4 sq.m/l @ 25 microns)
346 sq. ft. at 5 mils (8.5 sq.m/l @ 125 microns)

***NOTE:** Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.

SHELF LIFE: 2 years minimum.

COLORS: Aluminum only. (May bronze under certain application and curing conditions. Aluminum color will return upon weathering).

GLOSS: NA

ORDERING INFORMATION

Prices are shown on Corrosion Service Company Limited price list or may be obtained from Corrosion Service representatives or Head Office. Terms: Net 30 days.

SHIPPING WEIGHT:	2's	5's
Carbomastic 15	34 lbs. (15.2 kg)	84 lbs. (38.1 kg)
Carbomastic Thinner	10 lbs. in 1's (4.3 kg)	48 lbs. (21.8 kg)

FLASH POINT: (Pensky-Martens Closed Cup)

Carbomastic 15 Part A	200°F (93°C)
Carbomastic 15 Part B	94°F (34°C)
Carbomastic Thinner	73°F (23°C)

To the best of our knowledge, the technical data furnished above is accurate. However, no guarantee, warranty or condition, express or implied, whether arising by statute, by operation of law, or otherwise, (including merchantability and fitness for a particular purpose) is made or given and we assume no responsibility or liability of any kind for coverage, performance or damage resulting from or occasioned by the installation, operation, use or performance of this product.

APPLICATION INSTRUCTIONS

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determin correct surface preparation, mixing instructions, and application procedure. It is assumed that the proper product recommendati have been made. These instructions should be followed closely to obtain the maximum service from the materials.

SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in Carboline Thinner #2 or Toluol.

Steel: For immersion service, dry abrasive blast to a White Metal Finish in accordance with SSPC-SP5 to a degree of cleanliness in accordance with NACE #1 to obtain a 1 to 3 mil (25-75 micron) blast profile.

For Non-immersion service, clean per Power Tool or Hand Tool in accordance with SSPC-SP3 or SSPC-SP2, respectively, to a cleanliness defined by SSPC-St2 pictorial standards. Alternatively, for more severe environments, dry abrasive blast per SSPC-SP7 (brush-off blast) to a degree of cleanliness defined by SSPC Sa1 pictorial standards. Water blasting is an acceptable means of preparing the surface to a cleanliness defined by SSPC-St2.

MIXING: Mix separately, then combine and mix in the following proportions:

	2 Gal. Kit	5 Gal. Kit
Carbomastic 15 Part A	1 Gal.	2½ Gal.
Carbomastic 15 Part B	1 Gal.	2½ Gal.

Thin up to 25% by volume with Carbomastic Thinner.

POT LIFE: 4 hours at 75°F (24°C) and less at higher temperatures. Pot life ends when coating loses body and begins to sag.

APPLICATION TEMPERATURES:

	Material	Surfaces
Normal	65-85°F (18-29°C)	65-85°F (18-29°C)
Minimum	50°F (10°C)	40°F (4°C)
Maximum	90°F (32°C)	130°F (54°C)

	Ambient	Humidity*
Normal	65-85°F (18-29°C)	35-80%
Minimum	40°F (4°C)	0%
Maximum	100°F (38°C)	95%

*Do not apply when the surface is less than 5°F (2°C) above the dew point.

Special thinning and application techniques may be required above or below normal condition.

SPRAY: Use adequate air volume for correct operation. Hold gun 8-10 inches from the surface and at a right angle to the surface.

Use a 50% overlap with each pass of the gun. On irregular surfaces, coat the edges first, making an extra pass later.

1177/CDN

NOTE: The following equipment has been found suitable however, equivalent equipment may be substituted.

Conventional: Use 1/2" I.D. Mat'l. Hose.

Mfr. & Gun	Fluid Tip	Air Cap
Binks #18 or #62	67	67PB
DeVilbiss P-MBC or JGA	D	64
	Approx. .086" I.D.	Approx. 11 cfm @ 30 psi

Airless: Use 3/8" I.D. Mat'l. Hose.

Mfr. & Gun	Pump*
DeVilbiss JGB-507	QFA-514
Graco 205-591	President 30:1 or Bulldog 30:1
Binks Model 500	Mercury 5C

*Teflon packings are recommended and available from pump manufacturer.

Use a .023 to .027" tip with 2400 psi.

BRUSH OR ROLLER: Use clean, short bristled brush or medium nap roller. Work coating into all irregularities. Brush or roller application may result in less bright or uniform aluminum color.

DRYING TIMES:

Between coats:	6 days	40°F (4°C)
	3 days	60°F (16°C)
	24 hours	75°F (24°C)
	18 hours	90°F (32°C)
Final cure:	20 days	40°F (4°C)
	10 days	60°F (16°C)
	5 days	75°F (24°C)
	3 days	90°F (32°C)

CLEAN UP: Use Carboline Thinner #2 or Xylol.

STORAGE CONDITIONS:
Temperature: 45-110°F (7-43°C) Humidity: 0-100%

For more detailed information please consult specific Carboline Application Guides.

CAUTION: Contains flammable solvents. Keep away from sparks and open flames. In confined areas, workmen must wear fresh airline respirators. Hypersensitive persons should wear gloves or use protective cream on face and hands. All electric equipment and installations should be made and grounded in accordance with the Canadian electrical code. Workmen should be required to use only non-ferrous tools and to wear conductive and non-sparking shoes in areas where explosion hazards exist.

carboline

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10 PRICE ST., TORONTO, ONTARIO M4W 1Z6

Sterling

Sterling Limited P.O. Box 554 5-9 Philip Street St. Catharines, Ontario L2R 6X1 (416) 684-2322

14238 EPOXY MASTIC COMPOUND
DATA SHEET

1. DESCRIPTION

14238 is a high solids, high build, modified epoxy coating where adhesion to rusted steel is a requisite. Parts A & B are mixed prior to application. Application can be by airless spray or roller.

2. DATA

Viscosity	-	
Specific Gravity	-	Mixed - 1.4
Weight per Gallon	-	14.0 lbs.
% Solids	-	Part A - 100% by wt. Part B - 90% by wt. Mixed - 93% by weight. 90% by volume
Color	-	Metallic - aluminum to bronze
Gloss	-	Low
Recommended Film Thickness	-	10 mils, ~~25~~ 250 microns
Substrate	-	Ferrous surfaces, galvanized steel, tightly bound painted surfaces
Optimum Coverage	-	150-175 square feet per gallon

3. APPLICATION

Method	-	Airless spray, brush or roller
Reducer	-	92 thinners for cleanup
Thinning Ratio	-	Not recommended
Further Information	-	Mix 2 parts by volume Part B Hardener to 1 part by volume Part A Base allowing 15 minutes induction period. Surface preparation may be powder wire brush, SP-6 commercial blast or coating may be applied directly to sound rusted surfaces.

4. DRYING INSTRUCTIONS

	Air Dry	Bake
To handle	- 8 hrs. @ 70°F	
Full cure	- 7 days @ 70°F	

Toronto Sales Office: 282 Belfield Road, Rexdale, Ontario M9W 1H5 416-675-6213

International Paint Protective Coatings

Intergard
H.B. Mastic Aluminum

3E 728021
3E 990116

A self priming two part epoxy mastic for structural steel, bridges, tank exteriors, etc. Best results are obtained over blast cleaned surfaces, but may also be used over weathered steel which has been hand or power tool cleaned to remove old loose paint and loose rust. The coating which is coal tar free will give excellent protection in industrial environments.

Physical Properties

Vehicle Type	Two component modified epoxy
Pigmentation	Leafing aluminum and anticorrosive types
Solvent	Aromatic Hydrocarbons
Mixing Ratio	1:1 by volume
Pot Life	4 hours at 25°C (77°F) when thinned 10% by volume
Flash Point	27°C (81°F)
Solids by Volume	90% ± 2
Recommended Dry Film Thickness	5–8 mils
Theoretical Coverage	347 sq. ft./Imp. gal. @ 5 mils D.F.T.
Final Dry Time @ 20°C (68°F)	5 days
Colour	Aluminum
Storage Conditions	Normal
Product Weight	Base 12 lbs/Imp. gal. Catalyst 12.5 lbs/Imp. gal.

Limitations

Limitations

1. Not recommended for continuous immersion nor for temperatures above 80°C (175°F).
2. Do not use in areas with high acid or alkaline conditions.
3. This product will chalk slightly when continuously exposed to sunlight. This chalking does not lead to the total degradation of the film, but does lower the gloss.
4. Will not cure adequately below 5°C (40°F). For maximum performance cure temperature should be above 10°C (50°F).

Issue Date June 1980

Surface Preparation

Steel Ensure surface is free from oil, grease, loose paint, loose rust and other contaminants. Best results are achieved by applying to a blast cleaned surface. Alternately, hand tool clean to SSPC-SP2 or power tool clean to SSPC-SP3.

Application and Safety Precautions

Method of Application Airless spray. Small areas may be brushed.

Thinning Up to 10% by volume, International GTA 830 thinner.

Airless Spray Tip range .021–.027.
Total output fluid pressure—2800 p.s.i.

Clean Up After use, clean all equipment with International GTA830 thinner.

Safety Precautions a) Normal precautions such as gloves, face masks and barrier creams.
b) Adequate ventilation must be maintained.
c) If the product comes into contact with the skin, wash thoroughly with lukewarm water and soap. If the eyes are contaminated, flush with water or dilute boric acid and obtain medical attention at once.
d) Since this product contains flammable materials, keep away from sparks and open flames. No smoking should be permitted in the area.

International Paint Protective Coatings

Warranty disclaimer. The technical data given herein has been compiled for your help and guidance and is based upon our experience and knowledge.
However, as we have no control over the use to which this information is put, no warranty, express or implied, is intended or given. We assume no responsibility whatsoever for coverage, performance, or any damages, including injuries resulting from use of this information or of products recommended herein.

Amerlock™ 400

High solids epoxy coating

Ameron

Amerlock 400 is a high-performance general maintenance coating which can be applied to new or old steel, requiring only the removal of loose rust and scale. This self-priming topcoat gives performance superior to conventional coatings when applied over mechanically cleaned surfaces. Contains special ingredients which wet the surface and penetrate any existing rust. Can be applied over most existing coatings. Although Amerlock 400 does not require topcoating it can be overcoated with a range of topcoats.

Typical Uses

Most often used in those areas where blasting is impractical or impossible. Uses include steel structures in industrial facilities, bridges, tank exteriors, marine weathering, offshore, oil tanks, piping, roofs, water towers and other exposures subject to high humidity and moisture. Also suitable for concrete.

Amerlock 400 has good resistance to splash/spillage and fumes of acids, alkalies, solvents, and fresh and salt water. Amerlock 400 AL is recommended for immersion in neutral aqueous solutions where surface preparation is according to SSPC-SP-10* (near white).

Not recommended for immersion in acids or alkalies.

Topcoating

Amerlock 400 is available in a variety of colors, including aluminum, (Amerlock 400 AL) and therefore does not require a topcoat. If a further topcoat is required, contact your Ameron representative for suitable topcoat recommendations.

*Steel Structures Painting Council specifications

Physical Data

	Amerlock 400 Colors	Amerlock 400 AL Aluminum (formerly Amerlock 390)
Finish	Semigloss	Semigloss
Color	All	Aluminum
Applied over	Steel or concrete	Steel or concrete
Components	2	2
Volume solids (ASTM D 2697)	83%	90%
Dry film thickness per coat	5 to 8 mils (125 to 200 μ)	5 to 8 mils (125 to 200 μ)
Coats	1	1
Calculated coverage at	1593 - 1MP 6	1732 1MP 6
1 mil (25 μ)	1331 sq ft/gal (32.6 sq m/ltr)	1444 sq ft/gal (35.4 sq m/ltr)
5 mils (125 μ)	319 1MP 266 sq ft/gal (6.5 sq m/ltr)	346 1MP 288 sq ft/gal (7.1 sq m/ltr)
Allow for application losses and surface irregularities.		
Application	Airless or conventional spray. Can also be applied by brush or roller but additional coats may be required.	
Pot life	2½ hrs @ 70°F (21°C) 1½ hrs @ 90°F (32°C)	5½ hrs @ 70°F (21°C) 3½ hrs @ 90°F (32°C)
Indicated pot life is period of time after mixing that a five-gallon unit of material is sprayable when thinned as recommended. It is possible that mixture will appear fluid beyond this time period, but spraying and film build characteristics may be impaired.		
Drying time to touch	3 hrs @ 95°F (35°C) 6 hrs @ 70°F (21°C) 24 hrs @ 50°F (10°C)	4 hrs @ 95°F (35°C) 12 hrs @ 70°F (21°C) 36 hrs @ 50°F (10°C)
dry through	8 hrs @ 95°F (35°C) 20 hrs @ 70°F (21°C) 72 hrs @ 50°F (10°C)	10 hrs @ 95°F (35°C) 24 hrs @ 70°F (21°C) 72 hrs @ 50°F (10°C)
Mixing ratio (by volume)	1 part resin solution to 1 part curing solution	
Temperature resistance	200°F (93°C)	200°F (93°C)
Flash point (Setaflash)		
Resin	138°F (57°C)	112°F (44°C)
Cure	131°F (55°C)	116°F (46°C)
Thinner	Amercoat® 8	Amercoat 8
Cleaner	Amercoat 12	Amercoat 12
Packaging		
2-gal unit	1 gal resin solution in 1-gal container 1 gal curing solution in 1-gal container	
5-gal unit	2½ gals resin solution in 5-gal container 2½ gals curing solution in 2½-gal container	

Amerlock™ 400

Physical Data

	Amerlock 400 Colors	Amerlock 400 AL Aluminum (formerly Amerlock 390)
Shipping weight (approximate)		
2-gal unit	**Resin solution 13 lbs (5.9 kg)**	**Resin solution 12 lbs (5.5 kg)**
	Curing solution 12 lbs (5.5 kg)	**Curing solution 8 lbs (3.6 kg)**
5-gal unit	**Resin solution 33 lbs (15 kg)**	**Resin solution 33 lbs (15 kg)**
	Curing solution 30 lbs (13.6 kg)	**Curing solution 23 lbs (10.4 kg)**
Shelf life	**6 months from shipment date for each component when stored indoors at 40 to 100°F (5 to 38°C).**	

These products comply with South Coast Air Quality Management District Rule 1113 or equivalent regulations.

Application Data Summary

For complete information on surface preparation, environmental conditions, application and safety precautions, see Amerlock 400 or 400 AL Application Instructions.

Surface Preparation

Remove all loose rust, scale and foreign matter by dry abrasive blasting, water blasting or mechanical cleaning.

Equipment

Airless or conventional spray. (Can also be applied by brush or roller, but additional coats may be required to obtain proper thickness.)

Safety

Improper use and handling of this product can be hazardous to health and cause fire or explosion. Consult Code of Federal Regulations Title 29, Labor, parts 1910 and 1916 concerning occupational safety and health standards and regulations, as well as any other applicable federal, state and local regulations on safe practices in coating operations. Necessary safety equipment must be used and ventilation requirements carefully observed, especially in confined or enclosed spaces.

If you do not fully understand these warnings and instructions or if you cannot strictly comply with them, do not use the product.

Notice: This product is for industrial use only.

Warranty

Ameron warrants its products to be free from defects in material and workmanship. Ameron's sole obligation and Buyer's exclusive remedy in connection with the products shall be limited, at

Ameron's option, to either replacement of products not conforming to this Warranty or credit to Buyer's account in the invoiced amount of the non-conforming products. Any claim under this Warranty must be made by Buyer to Ameron in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life, or one year from the delivery date, whichever is earlier. Buyer's failure to notify Ameron of such nonconformance as required herein shall bar Buyer from recovery under this Warranty.

Ameron makes no other warranties concerning the products. No other warranties, whether express, implied or statutory, such as warranties of merchantability or fitness for a particular purpose, shall apply. In no event shall Ameron be liable for consequential or incidental damages.

Any recommendation or suggestion relating to the use of the products made by Ameron, whether in its technical literature, or in response to specific inquiry, or otherwise, is based on data believed to be reliable; however, the products and information are intended for use by Buyers having requisite skill and know-how in the industry, and therefore it is for Buyer to satisfy itself of the suitability of the products for its own particular use and it shall be deemed that Buyer has done so, at its sole discretion and risk. Variation in environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results.

Limitation of Liability

Ameron's liability on any claim of any kind, including claims based upon Ameron's negligence or strict liability, for any loss or damage arising out of, connected with, or resulting from the use of the products, shall in no case exceed the purchase price allocable to the products or part thereof which give rise to the claim. In no event shall Ameron be liable for consequential or incidental damages.

Amerlock 400 product profile

Years of Ameron research and development have culminated in the Amerlock concept whereby the advantages of epoxy resin chemistry can be fully utilized in a coating composition which facilitates one-coat, high-build application. Amerlock 400 is a high-performance, self-priming topcoat which can be applied to minimally prepared surfaces. The formulation is designed to optimize resin wet-out on the substrate. Adhesion is excellent to a variety of intact surfaces including tightly bound rust and old paint. The low solvent content reduces the risk of "lifting" the old paint on the surface. The composition has been balanced for convenient 1:1 packaging and excellent application characteristics by brush, roller or spray.

The low solvent content and resin balance of the formulation permits "resin wet-out" to occur as opposed to "solvent wet-out," thereby reducing the competition between resin and solvent for absorption/adhesion sites which occur in lower solids systems. Further benefits accrue because of reduced solvent entrapment, especially at the substrate—coating interface, often a major cause of coating failure. Since the solvent level is greatly reduced relative to conventional epoxies, the solvent release mechanism is of diminished importance, hence, there is less chance for pinholing in the film.

The viscosity modifiers in Amerlock are nonmigrating thereby assuring stable, extended-term product performance. These resin modifiers, in addition to controlling spray and application properties, also contribute to thermal shock resistance and the adhesive strength of Amerlock 400.

Testing has shown that due to the superior adhesive properties of Amerlock, the expected excellent corrosion control properties of a well-formulated epoxy system accrue to Amerlock. Scribe undercutting is minimal for this self-priming system and it outperforms conventional epoxies in this respect. Amerlock is relatively insensitive to surface moisture; adhesion is only marginally affected by application of Amerlock to a damp surface.

This curative in Amerlock provides a high order of flexibility and impact resistance to the film. Further, this curative when combined with the resin modifiers of the binder assures the deposition of a firmly adherent film even on wet or tightly rusted surfaces. Metal oxides on the substrate are usually hydroxylated and, in addition to anions and cations of the surface lattice, provide sites on which the organic groups of the resin mix may be absorbed. Hence, humidity and surface preparation (presence of rust) are less critical during industrial and offshore maintenance applications.

To summarize, the design of Amerlock obviates or reduces the importance of many of the causes of conventional coating failure; inadequate film thickness, insufficient surface preparation, entrapped solvent, pinholing and surface moisture contamination.

Application Instructions

Amerlock™/400

High solids epoxy self-priming topcoat

Amerlock/400 is a high solids epoxy coating used for protection of steel or concrete surfaces.

To obtain the maximum performance for which Amerlock/400 is formulated, strict adherence to all application instructions, precautions, conditions, and limitations is necessary.

Surface Preparation

Coating performance, in general, is proportional to the degree of surface preparation. Abrasive blasting is usually the most effective and economical method. However, when this is impossible or impractical, Amerlock/400 can be applied over mechanically cleaned surfaces.

Amerlock/400 may be used over most types of properly prepared and tightly adhering coatings, however, a test patch is recommended for use over existing coatings.

Remove all loose rust, dirt, moisture, grease or other contaminants from surface. Power-tool clean in accordance with SSPC-SP3* or hand-tool clean in accordance with SSPC-SP2* For more severe environments, dry abrasive blast in accordance with SSPC-SP7*, Brush-off blast. Water blasting is also acceptable.

New concrete must be treated by acid etching or abrasive blasting.

Newly galvanized surfaces—Remove any oil or soap film with detergent or emulsion cleaner. Use zinc treatment such as Galvaprep by Amchem Products, Ambler, Pennsylvania or blast lightly with fine sand.

Environmental Conditions

Air temperature—50 to 120°F (10 to 49°C)

*Steel Structures Painting Council Specification

Surface temperature—50 to 120°F (10 to 49°C)

The surface temperature must be at least 5°F (3°C) above the dew point to prevent moisture condensation.

Application Equipment

The following equipment is listed as a partial guide and suitable equipment from other manufacturers may be used. Adjustments of pressures and change of tip size may be needed to achieve the proper spray characteristics.

Airless spray—Standard airless spray equipment such as Graco Bulldog Hydra-Spray or larger, with a 0.017-in fluid tip.

Conventional spray—Industrial equipment such as DeVilbiss MBC or JGA or Binks 18 or 62 spray gun. A moisture and oil trap in the main air supply line, a pressure material pot with mechanical agitator and separate regulators for air and fluid pressure are recommended.

Power mixer—Mixer such as Jiffy Mixer manufactured by the Jiffy Mixer Company, San Francisco, California, powered by an explosion-proof electric motor.

Can also be applied by brush or roller, but additional coats may be required to attain proper thickness.

Application Procedure

1. Flush all equipment with Amercoat® 12 before use.

2. Stir Resin Solution and Curing Solution separately. Pour Curing Solution into Resin Solution and mix thoroughly.

Note—Pot life is 2½ hours at 70°F (21°C) and 1½ hours at 90°F (32°C). This is the period of time after mixing that a five-gallon unit of material is sprayable when thinned as recommended. It is possible that mixture will appear fluid beyond this time period, but spraying and film build characteristics may be impaired.

3. For optimum application properties, material should be from 65 to 90°F (18 to 32°C).

4. **Airless spray**—Thin cautiously with Amercoat 8. Thin with up to ½ pint Amercoat 8 per gallon of Amerlock/400.

Conventional spray—Thin with Amercoat 8 up to 1½ pints per gallon of Amerlock/400. Adjust conventional spray equipment to obtain adequate atomization at the lowest air pressure to minimize orange peel appearance.

Note: Only a small amount of thinner results in a great reduction in viscosity. Excessive thinning will cause running or sags. Use only Ameron recommended thinners.

5. Apply a heavy, wet coat in even, parallel passes, overlapping each pass 50% to avoid holidays, bare areas and pinholes. If required, follow with a cross spray pass at right angles to the first pass.

6. When applying Amerlock/400 directly over inorganic zincs or zinc-rich primers, a "mist coat" may be required to minimize bubbling. This will depend on the age of the Dimetcote,® the surface roughness and the conditions during curing.

7. In confined spaces, ventilate with clean air between coats and during the curing period following the final coat. The ventilating air temperature and relative humidity between coats must be such that condensation will not form on the surface between coats; i.e., at least 5°F (3°C) above the dew point.

8. Clean equipment with Amercoat 12 immediately after use.

9. If a second coat of Amerlock is required, observe the following time limits between coats:

	Minimum	Maximum
at 95°F (35°C)	6 hours	2 months
at 70°F (21°C)	14 hours	3 months
at 50°F (10°C)	48 hours	3 months

Drying and curing times —

to touch
3 hours at 95°F (35°C)
6 hours at 70°F (21°C)
24 hours at 50°F (10°C)

dry through
8 hours at 95°F (35°C)
20 hours at 70°F (21°C)
72 hours at 50°F (10°C)

For most uses, coating is ready for service as soon as it is dry through.

Safety Precautions

Amerlock/400 Resin Solution— Caution! Combustible. Vapor harmful. Contains liquid epoxy resin and mixed hydrocarbons. Irritating to skin, eyes and mucous membranes. Inhalation of high concentration of vapors can cause headache, nausea, vomiting or asphyxiation.

Amerlock/400 Curing Solution— Caution! Combustible. Vapor harmful. Contains ketones and polyamide resin. Irritating to skin, eyes and mucous membranes. May cause burns. Excessive exposure to vapors can cause headache, nausea or vomiting.

Precautions below apply to both components and mixed material.

Keep away from heat, sparks and open flames. Avoid breathing of vapor or skin and eye contact. Keep container closed and store in cool, well-ventilated area when not in use. Use adequate ventilation. Wear approved respiratory equipment and skin and eye protection.

Improper use and handling of this product can be hazardous to health and cause fire or explosion. Consult Code of Federal Regulations Title 29, Labor, parts 1910 and 1916 concerning occupational safety and health standards and regulations, as well as any other applicable federal, state and local regulations on safe practices in coating operations. Necessary safety equipment must be used and ventilation requirements carefully observed, especially in confined or enclosed spaces.

First aid—If affected by inhalation of vapor, remove to fresh air. If breathing is labored, start resuscitation and call physician. In case of skin contact, wash thoroughly with soap and water; for eyes, flush with plenty of water for at least 15 minutes and get medical attention. Launder contaminated clothing before reuse.

In case of fire—blanket flames with dry chemical, carbon dioxide, or foam. Wear self-contained breathing apparatus.

In case of spillage—absorb and dispose of in accordance with all applicable regulations. Eliminate all sources of ignition.

If you do not fully understand these warnings and instructions, or if you cannot strictly comply with them, do not use the product.

Notice—This product is for industrial use only.

Warranty

Ameron warrants its products to be free from defect in material and workmanship. Ameron's sole obligation and Buyer's exclusive remedy in connection with the products shall be limited, at Ameron's option, to either replacement of products not conforming to this Warranty or credit to Buyer's account in the invoiced amount of the non-conforming products. Any claim under this Warranty must be made by Buyer to Ameron in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life, or one year from the delivery date, whichever is earlier. Buyer's failure to notify Ameron of such non-conformance as required herein shall bar Buyer from recovery under this Warranty.

Ameron makes no other warranties concerning the product. No other warranties, whether express, implied, or statutory, such as warranties of merchantability or fitness for a particular purpose, shall apply. In no event shall Ameron be liable for consequential or incidental damages.

Any recommendation or suggestion relating to the use of the products made by Ameron, whether in its technical literature, or in response to specific inquiry, or otherwise, is based on data believed to be reliable; however, the products and information are intended for use by Buyers having requisite skill and know-how in the industry, and therefore it is for Buyer to satisfy itself of the suitability of the products for its own particular use and it shall be deemed that Buyer has done so, at its sole discretion and risk. Variation in environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results.

Limitation of Liability

Ameron's liability on any claim of any kind, including claims based upon Ameron's negligence or strict liability, for any loss or damage arising out of, connected with, or resulting from the use of the products, shall in no case exceed the purchase price allocable to the products or part thereof which give rise to the claim. **In no event shall Ameron be liable for consequential or incidental damages.**

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Brea, California 92621

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4191 MZ Geldermalsen, The Netherlands

Ameron®
Protective Coatings
Division

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Application Instructions

Amerlock™ 400 AL

Formerly Amerlock 390

Aluminum
High solids epoxy coating

Amerlock 400 AL is an aluminum high solids epoxy coating used for protection of steel or concrete surfaces.

To obtain the maximum performance for which the aluminum version of Amerlock 400 AL is formulated, strict adherence to all application instructions, precautions, conditions, and limitations is necessary.

Surface Preparation

Coating performance, in general, is proportional to the degree of surface preparation. Abrasive blasting is usually the most effective and economical method. However, when this is impossible or impractical, Amerlock 400 AL can be applied over mechanically cleaned surfaces.

Amerlock 400 AL may be used over most types of properly prepared and tightly adhering coatings, however, a test patch is recommended for use over existing coatings.

Remove all loose rust, dirt, moisture, grease or other contaminants from surface. Power-tool clean in accordance with SSPC-SP3* or hand-tool clean in accordance with SSPC-SP2*. For more severe environments, dry abrasive blast in accordance with SSPC-SP7*, Brush-off blast. Water blasting is also acceptable.

New concrete should be treated by acid etching or abrasive blasting.

Newly galvanized surfaces—Remove any oil or soap film with detergent or emulsion cleaner. Use zinc treatment such as Galvaprep by Amchem Products, Ambler, Pennsylvania or blast lightly with fine sand.

*Steel Structures Painting Council Specification

For immersion service, dry abrasive blast in accordance with SSPC-SP10*, Near-White blast.

Environmental Conditions

Air temperature—50 to 120°F (10 to 49°C)

Surface temperature—50 to 120°F (10 to 49°C)

The surface temperature must be at least 5°F (3°C) above the dew point to prevent moisture condensation.

Application Equipment

The following equipment is listed as a partial guide and suitable equipment from other manufacturers may be used. Adjustments of pressures and change of tip size may be needed to achieve the proper spray characteristics.

Airless spray—Standard airless spray equipment such as Graco Bulldog Hydra-Spray or larger, with a 0.017-in. fluid tip.

Conventional spray—Industrial equipment, such as DeVilbiss MBC or JGA or Binks 18 or 62 spray gun. A moisture and oil trap in the main air supply line, a pressure material pot with mechanical agitator and separate regulators for air and fluid pressure are recommended.

Power mixer—Mixer such as Jiffy Mixer manufactured by the Jiffy Mixer Company, San Francisco, California, powered by an explosion-proof electric motor.

Can also be applied by brush or roller, but additional coats may be required to attain proper thickness.

Application Procedure

1. Flush all equipment with Amercoat® 12 before use.
2. Stir resin solution using an explosion-proof power mixer to disperse pigments.
3. Add curing solution to resin solution. Mix thoroughly with mixer until uniformly blended to a workable consistency.

Note—Pot life is 5½ hours at 70°F (21°C) and 3½ hours at 90°F (32°C). This is the period of time after mixing that a five-gallon unit of material is sprayable when thinned as recommended. It is possible that mixture will appear fluid beyond this time period, but spraying and film build characteristics may be impaired.

4. Do not mix more material than can be used within the expected pot life.
5. May be thinned for workability with up to 1½ pints Amercoat 8 per gallon of Amerlock 400 AL.
6. Apply a heavy, wet coat in even, parallel passes with 50% overlap to avoid holidays, bare areas and pinholes. If material temperature is above 110°F (44°C), sagging may occur.
7. In case of damage, repair by brush or spray.
8. Clean equipment with Amercoat 12 immediately after use.
9. If a second coat of Amerlock 400 AL is required, observe the following time limits between coats:

	Minimum	Maximum
at 95°F (35°C)	8 hours	2 months
at 70°F (21°C)	18 hours	3 months
at 50°F (10°C)	48 hours	3 months

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Drying and curing times

to touch
4 hours at 95°F (35°C)
12 hours at 70°F (21°C)
36 hours at 50°F (10°C)

dry through
10 hours at 95°F (35°C)
24 hours at 70°F (21°C)
72 hours at 50°F (10°C)

For most maintenance use, coating is ready for service as soon as it is dry through.

For immersion service, cure 3 days at 95°F (35°C), 7 days at 70°F (21°C), or 21 days at 50°F (10°C).

Safety Precautions

Amerlock 400 AL resin solution—Caution! Combustible. Contains epoxy resin. Can cause eye, skin and mucous membrane irritation. Prolonged or repeated breathing of vapors can cause headache, nausea or dizziness. Keep away from heat, sparks, open flames or strong oxidizers. Avoid skin and eye contact or excessive breathing of vapors. Keep container closed and store in cool area when not in use. Use adequate ventilation. Wear approved respiratory equipment and skin and eye protection.

Amerlock 400 AL curing solution—Caution! Combustible. Contains polyamide resin and xylol. Extremely irritating to skin and eyes with possible skin burns or permanent eye injury. Excessive inhalation of vapors can cause headache, nausea, dizziness or irritation to respiratory tract. Keep away from open flames, heat, sparks or strong oxidizers. Keep container closed and upright when not in use. Avoid breathing of vapors or skin and eye contact. Use adequate ventilation. Wear respirator, protective clothing, and goggles or face mask.

The following precautions apply to both resin and curing solutions.

Improper use and handling of this product can be hazardous to health and cause fire or explosion. Consult Code of Federal Regulations Title 29, Labor, parts 1910 and 1916 concerning occupational safety and health standards and regulations, as well as any applicable state and local regulations on safe practices in coating operations. Necessary safety equipment must be used and ventilation requirements carefully observed, especially in confined or enclosed spaces.

First aid—Excessive exposure to vapor, provide fresh air. Give artificial respiration if breathing is labored. For skin contact, wash thoroughly with soap and water; for eyes, flush immediately with plenty of water for at least 15 minutes and get medical attention at once. Launder contaminated clothing before reuse.

In case of fire—blanket flames with dry chemical, carbon dioxide or foam.

In case of spillage—flush with water. Absorb and dispose of in accordance with all applicable regulations.

If you do not fully understand these warnings and instructions, or if you cannot strictly comply with them, do not use the product.

Notice—This product is for industrial use only.

Warranty

Ameron's products are warranted to be free of defects in material or workmanship. If a product does not conform with this Warranty, Buyer must notify Ameron within five days of discovery of the defect, but in no event later than one year after delivery date or after expiration of the applicable shelf life, whichever is shorter. Ameron's sole obligation under this Warranty shall be at its option, to credit Buyer's account, or to supply replacement material or repair. Failure to notify Ameron of nonconforming goods under this Warranty, within the time specified above, shall bar Buyer from recovery hereunder.

It is expressly understood that Ameron makes no other warranties concerning the goods, and the sole remedy of the Buyer and the sole liability of Ameron for product defect shall be as set forth above. No other warranties, express or implied, whether of merchantability or of fitness for any particular use shall apply. Ameron shall not be responsible for consequential damages.

Any recommendation or suggestion relating to the use of the products made by Ameron either in technical literature or in response to specific inquiry is given in good faith, but it is for Buyer to satisfy itself of the suitability of the goods for its own particular purpose and it will be deemed to have done so.

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Ameron®
Protective Coatings
Division

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To protect personnel against toxic hazards

To prevent fire or explosion

Whenever coatings containing volatile solvents or toxic substances are used, proper ventilation and protective measures must be provided during application and drying to keep solvent vapor concentrations within safe limits and to protect personnel against toxic hazards. This is especially true in confined spaces such as tank interiors. Consult Code of Federal Regulations Title 29, Labor, parts 1910 and 1916 concerning occupational safety and health standards and regulations, as well as any applicable state and local regulations on safe practices in coating operations. Necessary safety equipment must be used and ventilation requirements carefully observed, especially in confined or enclosed spaces.

Keep solvent-containing materials away from heat, sparks, and open flame. Avoid inhalation of vapors or spray mist. Avoid contact with eyes or skin. Keep containers tightly closed and upright to prevent leakage when not in use.

Refer to application instructions for the material being applied for further detailed safety precautions. Department of Labor Material Safety Data Sheets are available on request.

If you do not fully understand these warnings and instructions, or if you cannot strictly comply with them, do not use the product.

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